C-4.1 Analyze and balance equations for simple synthesis, decomposition, single replacement, double replacement, and combustion reactions.

Revised Taxonomy Level 4 **<u>Analyze</u> conceptual knowledge**

In Physical Science, Students:

- Apply a procedure to balance equations for a simple synthesis or decomposition reaction. (PS-4.9)
- Recognize simple chemical equations (including single replacement and double replacement) as being balanced or not balanced. (PS-4.10)

It is essential for students to:

- Classify typical chemical equations based on the composition of the reactants
  - Single replacement
  - Double replacement
  - Synthesis (composition)
  - Decomposition
  - Combustion
- Balance any chemical reaction when given the reactants and the products, including the notations used to indicate the phase of the substance.
  - $Cl_2(g)$ chlorine gas
  - $H_2O(l)$ water as a liquid
  - $NaCl(s)$ sodium chloride as a solid
  - $NaCl(aq)$ sodium chloride dissolved in water

Assessment

The revised taxonomy verb for this indicator is analyze, which means to "break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose". Because the indicator is written as <u>conceptual knowledge,</u> assessments should require that students understand the "interrelationships among the basic elements within a larger structure that enable them to function together". In this case, that students understand how selected chemical compounds react in order to predict the products of chemical reactions, and then apply appropriate protocol and procedures for writing and balancing chemical equations to represent the equation in the accepted form.